



Contents lists available at ScienceDirect

Int. J. Production Economics

journal homepage: www.elsevier.com/locate/ijpe

Explaining the competitive advantage of logistics service providers: A resource-based view approach

Chee Yew Wong^{*}, Noorliza Karia

Business School, University of Hull, Cottingham Road, Hull HU6 7RX, UK

ARTICLE INFO

Article history:

Received 29 November 2008

Accepted 30 August 2009

Available online 9 September 2009

Keywords:

Logistics service providers

Third-party logistics

Logistics outsourcing

Resource-based view

Competitive advantage

ABSTRACT

This article identifies strategic logistics resources acquired and bundled by logistics service providers (LSPs) to achieve competitive advantage. Based on a theoretical framework derived from the resource-based view (RBV) theory, contents of a database of company profiles of 15 selected LSPs are analysed. Results show that all LSPs have been acquiring physical, human, information, knowledge and relational resources and then bundling them together in various specific manners to create inimitable and firm-specific capabilities. However, only some of them performed well financially. The findings contribute to the conceptualisation and measurement of strategic logistics resources and the identification of resource bundling processes.

© 2009 Elsevier B.V. All rights reserved.

1. Introduction

Since recognised as a new industry in the late 1980s, the logistics service industry has been experiencing growth (Sheffi, 1990). However, the reality is that not all logistics service providers (LSPs) manage to become competitive (Min and Foo, 2006). A recent survey conducted by Langley and Capgemini (2007) indicates that many users are, overall, dissatisfied with services provided by their LSPs. The survey reported that many LSPs failed to deliver the expected cost reduction, trustworthy relationship, and increasing needs for wider portfolio of logistics services and geographical coverage and advanced information technology (Langley and Capgemini, 2007). Consequently, logistics service contracts typically change hands every 2 years and many contracts are limited to only transport and warehouse services (Langley and Capgemini, 2007). The logistics service industry needs theories and solutions to achieve sustainable competitive advantage.

Some early logistics studies suggested that logistics performance can be explained by firms' resources including physical resources, technology resources, and manage-

rial competences (e.g. Chiu, 1995; Larson and Kulchitsky, 1999; Alshawi, 2001; Myers et al., 2004; Beinstock et al., 2008). However, these studies were predominantly concerned with the resources of users but ignored those of service providers (Gunasekaran and Ngai, 2003). Instead, some scholars have argued for the need for studies based on the perspective of provider resources in order to enhance the understanding of LSP competitive advantages (Gunasekaran and Ngai, 2003; Panayides, 2007; Ellinger et al., 2008). Such studies will contribute to the logistics industry because logistics service ability or competence could contribute to the market share of LSPs indirectly (Daugherty et al., 1998).

The role of resources in the competitive advantages of LSPs can be easily traced from the strategies of most LSPs. In the past decades many LSPs have been engaging in a mixture of organic expansion, merger, acquisition and alliance. Through these activities, LSPs acquire or gain access to resources such as logistics hubs, aircraft, skilled workforces, track and trace software, logistics expertise and knowledge in order to achieve growth and competitive advantage. Also, different LSPs have different portfolios of assets. Some LSPs are asset-heavy (property-based) whereas some are asset-light but knowledge-based (Das and Teng, 2000). Such behaviour can be explained by the resource-based view (RBV) theory. According to RBV

^{*} Corresponding author.

E-mail address: c.wong@hull.ac.uk (C. Yew Wong).

theory, firms gain sustainable competitive advantages by ensuring appropriate access to a bundle of idiosyncratic resources which are valuable, rare, inimitable, and non-substitutable (Penrose, 1959; Wernerfelt, 1984; Barney, 1991; Eisenhardt and Martin, 2000). RBV theory appears to be able to provide a key theoretical foundation for explaining the competitive advantages of LSPs.

The main objectives of this article are to identify different types of logistics resources and their characteristics, and based on empirical evidence explore how different logistics resources can be bundled together to achieve LSPs' competitive advantages. It attempts to answer three questions: (1) what logistics resources are accessed by these LSPs? (2) How are different resources bundled together? (3) What are the characteristics of resources accessed by the successful LSPs? Answers for the first question will contribute to the development of the constructs of logistics resources as well as the establishment of the measurement scales for each of these constructs. Answers for the second question will further provide insights to logistics managers on how logistics resources may be bundled together to gain competitive advantages, knowing the fact that the possession of resources does not always warrant success (Rubin, 1973; Barney, 1991). Finally, answers for the third question are paramount to ascertain the specific characteristics of resources accessed by successful LSPs.

To answer the three research questions, comprehensive content analyses of company profiles of 15 LSPs are carried out. The protocol of the content analysis is established based on a theoretical framework of resource-based competitive advantages derived from the RBV theory and some recommended best-practices for content analysis (e.g. Barelson, 1952; Holsti, 1969; Krippendorff, 1980; Guthrie et al., 2004). The article is organised as follows. Section 2 develops a theoretical framework which tentatively explains the competitive advantages of LSPs based on RBV theory and some relevant logistics literature. Section 3 describes the chosen methodology. Section 4 analyses findings pertinent to the three research questions. Section 5 critically discusses the findings and their implications to theory and practice. Finally, Section 6 concludes the research and provides suggestions for further research.

2. Theoretical background

2.1. Resource-based view theory

Traditionally the competitive advantage of a firm has been explained by referring to the firm's strategies, process capabilities, and resources (Porter, 1985; Prahalad and Hamel, 1990; Barney, 1991; Persson and Virum, 2001). The asset-light and asset-based strategies (Murphy and Poist, 1998) applied by different LSPs indicate that resources (assets) can be one of the explanatory factors for the competitive advantages of LSPs. Edith Penrose was one of the first scholars who recognised the importance of resources in achieving a firm's competitive position (Penrose, 1959). She argued that a firm's resources may

only contribute to a firm's competitive position to the extent that they are exploited in such a manner that their potentially valuable services are made available to the firm.

In 1991, Barney published an influential article called "firm resources and sustained competitive advantage" in the *Journal of Management* to formalise resource-based (RBV) theory. This article put forward two fundamental assumptions for RBV theory: (1) resources (and capabilities) are heterogeneously distributed among firms and (2) resources are imperfectly mobile. These two assumptions conjointly allow for differences in firm resource endowments to both exist and persist over time, thereby becoming a resource-based competitive advantage (Barney, 1991). In this article, RBV theory is applied to explain the competitive advantages of LSPs because the above assumptions suggested by Barney (1991) reflect the actual business environment in the logistics service industry. In the logistics industry, resources are distributed heterogeneously across different LSPs, freight operators, forwarders, and users. Furthermore, these resources (especially knowledge resources) are often tacit and "sticky" (imperfectly mobile) and cannot be transferred from one LSP to another without cost. Even though RBV is not a prescriptive theory (Priem and Butler, 2001), it is useful in explaining how a firm may sustain its competitive advantage by acquiring and exploiting the "right" resources.

In addition to the above two assumptions, Barney argued that resources that are valuable (i.e., useful in exploiting opportunities and/or neutralising threats from the environment) and rare (i.e., uncommon) would attain a competitive advantage and enjoy improved performance in the short term. However, in order for a firm to sustain these advantages over time its resources must also be costly to imitate and difficult to be substituted (Barney, 1991). When there is causal ambiguity about the sources of competitive advantage, it becomes costly for other firms to imitate. High degrees of tacitness, complexity, or specificity will produce a high degree of ambiguity (Reed and DeFillippi, 1990). Valuable, rare, inimitable and non-substitutable resources are called strategic resources in this article.

The RBV literature recognises that resources are not of much use by themselves. Instead of merely possessing resources, Rubin (1973) argued that firms must process raw resources to make them useful. Mahoney and Pandian (1992) reminded scholars that "a firm may achieve rents (advantages) not because it has better resources, but rather the firm's distinctive competence involves making better use of its resources". The missing link between "resource possession" and "resource exploitation" is obvious (Barney and Arkan, 2001; Priem and Butler, 2001). Priem and Butler (2001) criticised RBV literature by arguing that the knowledge of where, when and how resources may be useful remains in a "black box". To unveil this black box, Teece et al. (1997, p. 516) put forward the concept of dynamic capability, which is defined as "the firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments". Their suggestion has led to further research to identify processes that are used to build resource configurations in dynamics markets (Eisenhardt and Martin, 2000).

To further understand the “black box”, Sirmon et al. (2007) suggested a theory of resource management. The theory includes comprehensive processes in structuring a firm’s resource portfolio, bundling the resources to build capabilities, and leveraging those capabilities to realise a competitive advantage. Structuring the resource portfolio involves using processes (i.e., acquiring, accumulating, and divesting) to obtain the resources that the firm will use for bundling and leveraging purposes. Bundling refers to processes used to integrate resources in order to create capabilities (Sirmon et al., 2007). It is considered as the major means to make resources useful (e.g. Wernerfelt, 1984; Barney, 1991). In addition to bundling, Sirmon et al. (2007) added another process, i.e. leveraging, which involves the set of processes (i.e., mobilising, coordinating, and deploying) used to exploit capabilities to take advantage of opportunities in specific markets.

2.2. Theoretical framework

The theoretical framework for this article is largely adopted from Sirmon et al.’s theory of resource management and Teece et al.’s (1997) concept of dynamic capability. The theoretical framework comprises of processes necessary for a LSP to achieve competitive advantages. The theoretical framework, as illustrated in Fig. 1, consists of the following four key stages:

1. At any point in time a LSP has a portfolio of resources/capabilities and a particular level of competitiveness. Embedded in the LSP’s strategy, there may be a business plan for structuring a future portfolio of strategic resources to enhance its competitiveness (Sirmon et al., 2007).
2. To gain competitive advantages, the LSP executes its business plan by accessing strategic resources which are valuable, rare, inimitable, and non-substitutable (Penrose, 1959; Wernerfelt, 1984; Barney, 1991, 2001). This may be achieved by acquiring, accumulating, and divesting resources (Sirmon et al., 2007).
3. Upon gaining access to strategic resources, there is a need for some unique means of bundling them to create useful capabilities which are then used to exploit market opportunities or eliminate competitive threats (Rubin, 1973; Barney, 1991; Mahoney and Pandian, 1992; Sirmon et al., 2007). Different capabilities may also be leveraged (by mobilising, coordinating, and deploying resources) to take advantage of specific market opportunities (Sirmon et al., 2007).
4. Upon achieving a new portfolio of resources and successful bundling/leveraging of these resources to

create new capabilities, the LSP may gain competitive advantage in terms of long-term advantages in financial and operational performance, in some instances. Since competitive advantage will always be temporary, the LSP will need to continue the resource structuring, accessing and bundling activities.

This theoretical framework can indeed be considered as a model of the pathway to achieving competitive advantage by access to and effective bundling of strategic resources. The main emphasis of this framework is not just to enable the identification of idiosyncratic or firm-specific resources according to the RBV theory, but also the need to enhance our understanding of the “black box” or the “process of managing resources” (Sirmon et al., 2007). In fact, a recent literature review by Newbert (2007) supports this emphasis. He found that 50% of the articles which attempted to test the RBV theory provided insignificant supports to the RBV theory. He referred these contradictory findings to the fact that most previous studies had considered only the characteristics of resources but ignored other (much more significant) explanatory factors such as capability and resource (process) management (Newbert, 2007).

2.3. Resource-based view and LSPs’ competitive advantage

RBV theory is no stranger to logistics literature (e.g. Innis and La Londe, 1994; Olavarrieta and Ellinger, 1997; Lai et al., 2008). Some logistics literature has suggested the existence of direct or indirect relationships between various resources and performances or competitive advantages of LSPs. In this article, logistics hubs, warehouse capacities, and transport vehicles are considered physical resources. Basically, transport vehicles and warehouses are required for the movement of inventory resources such as raw material, work in process, or finished goods (Closs and Thompson, 1992; Karia and Razak, 2007). Nowadays, many LSPs possess transport and warehouse resources (Murphy and Poist, 2000) because they are responsible for the movement of goods from one point to another (Wouters and Sportel, 2005). Even asset-light LSPs such as forwarders and fourth-party logistics service providers (4PL) need to gain access to physical resources using various partnership and contract arrangements. Since physical resources are required to deliver products to customers, it is important to gain access to these resources to maintain the control of logistics activity and to improve the reliability and speed of delivery. Physical resources are valuable when exploited appropriately (Rubin, 1973). They may become rare when there is a shortage. Also, some

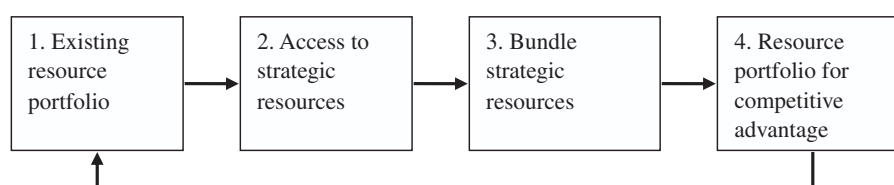


Fig. 1. Theoretical framework (adopted from Sirmon et al., 2007).

physical resources (e.g. vessels and cargo planes) can be costly to imitate due to the need for high capital investments.

Plenty of logistics literature has suggested technology (especially information technology, IT) as another group of strategic resources for LSPs (e.g. Chiu, 1995; Hammant, 1995; Alshaw, 2001; Gunasekaran and Ngai, 2003; Aldin et al., 2004; Myers et al., 2004; Lai et al., 2005; Sanders and Premus, 2005; Brah and Lim, 2006; Beinstock et al., 2008). Many LSPs are increasingly leveraging on IT such as EDI, hardware, and communication technology to reduce costs, increase productivity and improve customer services (Chiu, 1995; Karia and Razak, 2007). IT also provides real-time visibility of demand forecast information, inventory levels, production schedules, and material flows (Hammant, 1995). Furthermore, the use of IT is valuable in helping LSPs to monitor status of inventory, improve utilisation of transport vehicles and warehouses, eliminate duplication of effort in performing various logistics activities, and complete delivery tasks timely and effectively (Lai et al., 2005).

The information system (IS) literature suggests that IT-related resources encompasses raw IT spending, technical IT skills, generic information technologies, shared knowledge, and IT infrastructure flexibility (Mata et al., 1995; Bharadwaj, 2000; Ray et al., 2005). Taking into account all these elements, information resources are operationalised as the capabilities of information systems to integrate with internal and external processes (Lewis and Talalayevsky, 2000). This is because information resources are required to integrate suppliers, manufacturers, wholesalers, retailers, transportation carriers, LSPs, and final customers together. Information resources become costly to imitate when they are supported by proprietary technologies and require specific technical skills, and in some instances, access to capital (Mata et al., 1995).

Human resources (HR) are critical logistics resources since the logistics service is a “people” oriented business (Novack et al., 1992; Drew and Smith, 1998; Zineldin, 2004). In the HRM literature, some scholars argue that the human capital pool (highly skilled and highly motivated workforce) has the potential to constitute a source of sustainable competitive advantage (e.g. Wright et al., 1994). The strategic value of human assets has to be recognised because they directly affect cost, quality, responsiveness, and customer satisfaction (Karia and Razak, 2007; Panayides, 2007). Furthermore, competence and skilful human resources are essential to inspire trust and confidence that will lead to quick service and performance (Hunt, 2001). In order to build up human capital in the logistics, Myers et al. (2004) suggested the need for developing four skill sets—social skills, decision skills, problem-solving skills, and time management skills. Murphy and Poist’s (1991, 2007) longitudinal studies of skill sets for logisticians should not be limited to transport and logistics and general business skills, in fact management skills and knowledge in supply chain management are becoming more important. In this article, the number of highly skilled workforce is operationalised as the measure of human resource; and the skill sets identified by Myers et al. (2004) and Murphy and Poist (1991, 2007) are included.

In addition to skilful workforce, knowledge and competence are often considered as idiosyncratic resources. Knowledge is intangible and knowing-how is often firm-specific and tacit because it is embedded in human capital and organisational routines (Grant, 1996a; Teece, 1998). According to Prahalad and Hamel (1990), it is the knowledge or competence of human assets that really matters because “the real sources of advantage are to be found in management’s ability to consolidate corporate-wide technologies and production skills into competencies that empower individual businesses to adapt quickly to changing opportunities” (p. 4). Similarly, Grant (1996b) views organisational capabilities as the outcome of knowledge integration where a firm integrates the specialist knowledge resident in individuals into goods and services. Technical expertise, market knowledge and managerial experience are essential criteria for users to select logistics partners (Büyükoğkan et al., 2008). Thus, this article operationalises knowledge resources as the abilities to gaining access to, and bundling of valuable and rare resources (especially physical, information and human resources) to create inimitable and non-substitutable capabilities (Prahalad and Hamel, 1990; Barney, 1991; Grant, 1996b).

Some recent literature has suggested relationship as one of the key success factors for LSPs (e.g. Chiu, 1995; Panayides and So, 2005; Panayides, 2007; Karia and Razak, 2007). Collaboration is the driving force behind effective supply chain management and may be the ultimate core capability (Min et al., 2005). In the 2007 annual survey of logistics outsourcing, Langley and Capgemini (2007) concluded that relationship is the next strategic weapon for LSPs to achieve and maintain competitive advantages. Relationship is the key to achieve resource complementarity among business partners (Amit and Schoemaker, 1993). Relationship is an important predictor of logistics performance since through it, the users and the service providers are able to work closely to reduce costs and to improve delivery quality, reliability, speed, and flexibility (Chiu, 1995; Brewer and Speh, 2000; Mentzer et al., 2000; Karia and Razak, 2007) and hence positively affect LSP performance (Panayides and So, 2005; Panayides, 2007). Relationship also provides greater mutual understanding and commitment amongst users and providers to jointly plan and execute logistics activities. In this article, relational resources are operationalised as the ability to build and maintain long-term working relationships with key suppliers and customers in such a way that the relationship is hard for other parties to easily replace. A long-term relationship is built on mutual trust and commitment and it is long recognised that it leads to better performance (Kahn and Mentzer, 1998; Min et al., 2005).

In summary, both RBV theory and some logistics literature suggest resources as the explanatory factors for the competitive advantages of LSPs. The logistics literature has identified physical resources, information resources, human resources, knowledge resources, and relational resources as strategic logistics resources. The main benefit of applying RBV theory to logistics research is that the theory can further identify the idiosyncratic characteristics

of strategic logistics resources. Tangible resources such as physical resources and human resources are of no use unless they are effectively exploited (Rubin, 1973; Mahoney and Pandian, 1992); they are also often easier to gain access to (imitable). Instead, intangible resources such as knowledge resources (Lewis, 1995; Hunt, 2001; Mills et al., 2003), information resources (Itami and Roehl, 1987), and relational resources (Panayides and So, 2005; Panayides, 2007) are often used to exploit tangible resources to achieving competitive advantage (Miller and Shamsie, 1996), especially in dynamic and competitive business environments (Bettis and Hitt, 1995). Intangible resources are often more vague and difficult to replicate (Reed and DeFillippi, 1990). To further enhance RBV theory and current logistics literature, there is a need for the development of detailed knowledge of resource bundling in such a way that the competitive advantage of LSPs can be better explained.

3. Research methodology

3.1. Content analysis

In order to identify different types of logistics resources and their characteristics and explore how different logistics resources can be bundled together, document (content) analysis is applied. Content analysis is a research technique for the objective, systematic and quantitative description of the manifest content of communication (Barelson, 1952; Holsti, 1969; Ellinger et al., 2003; Krippendorff, 1980). Content analysis has been proven effective in analysing research approaches in logistics research (Gubi et al., 2003; Spens and Kovacs, 2006). Content analysis has also been applied to study consumer behaviour and complaints (Carlson, 2008; Park, 2005) and websites of B2B companies (Ellinger et al., 2003). These studies applied content analysis mainly because it is a very transparent research method. Its sampling procedure and coding scheme can be clearly set out so that replications and follow-up studies are feasible (Bryman and Bell, 2007).

Content analysis is a research method that offers the possibility to investigate implicit assumptions (latent content) alongside explicit statements (manifest content) in a text (Guthrie et al., 2004; Krippendorff, 1980). It is a highly effective method because it can be applied to a wide variety of unstructured information. It can allow a certain amount of longitudinal analysis with relative ease. Furthermore, content analysis is deeply rooted in the quantitative research (Bryman and Bell, 2007). Its aim is to produce quantitative accounts of the raw material in terms of the categories specified in the coding schemes. The feature of quantification adds to the general sense of the systematic and objective application of neutral rules, so that it becomes possible to analyse data with some certainty and in a systematic way.

3.2. Sampling procedure

The first step in content analysis is to determine the documents to be analysed and the units of analysis

(Krippendorff, 1980; Guthrie et al., 2004). It is preferable to choose documents that are authentic, reliable and relevant but it is often dependent on the availability and accessibility of the documents (Cullinane and Toy, 2000). In this article, company profiles of LSPs published by the Datamonitor (www.datamonitor.com) are the chosen documents for content analysis. Datamonitor is a leading business information company specialising in industry analysis. The company profiles compiled by Datamonitor provide accurate financial data, strategic decisions, announcements, key events (such as merger, acquisition, joint-venture, disposal, financial crisis, etc.), product segmentation, and new product development. These company profiles are relevant to this research because they report the activities of LSPs which provide access to strategic logistics resources and competitive advantages.

Company profiles of 15 of the largest global LSPs from the Datamonitor database are chosen for this research. These largest global LSPs, in term of their revenues (Rushton and Walker, 2007) are: Schenker AG, Ryder System, Inc., Kuehne+Nagel (K+N), FedEx Corporation, TNT NV, United Parcel Service, Inc., DHL, Exel PLC (acquired by DPWN in 2005), Yamato Holdings Co. Ltd., Panalpina World Transport (Holding) Ltd., Expeditors International of Washington, Inc., Penske Corporation, Wincanton PLC, Kintetsu World Express and Nippon Express Co. Ltd. They are integrated logistics providers (full and integrated logistics services) not single providers (transport or warehousing service only) or the typical non-vessel operating common carriers (NVOCC) forwarders (Africk and Calkins, 1994). They vary in organisation size (from about 7000 employees to 428,000 employees) and their operations cover from 15 to 220 countries but they compete within similar markets, i.e. they provide similar service portfolios and compete for logistics contracts among similar groups of customers. Because this research looks into resource-based competitive advantage it is important to include both asset-light and asset-heavy LSPs. Finally, they vary in organisation size (from about 7000 employees to 428,000 employees) and their operations cover from 15 to 220 countries. Only 15 LSPs are included because the main objective of this research is to explore but not to test any theory.

3.3. Coding scheme

The development of coding scheme has to base on a theoretical framework (Guthrie et al., 2004). For this research, the theoretical framework developed earlier (see Fig. 1) and the operational definitions of different resources established in Section 2 form the foundations of the coding scheme in Table 1.

To ensure the objectivity, validity, and reliability of the content analysis, exhaustive pre-defined categories for the four stages of the theoretical framework are developed, considering the needs for both qualitative and quantitative information (Guthrie et al., 2004; Pasukeviciute and Roe, 2005). Decisions rules which guide the categorisation of information and the capture of latent (implicit) and manifest (explicit) information are pre-determined prior

Table 1

Coding scheme for content analysis.

Indicator	Pre-defined categories	Decision rules for ensuring objectivity, validity and reliability
Strategic resource	<i>Definite categories^a</i> <ul style="list-style-type: none"> Physical-hubs, bases, road vehicles, aircraft, etc. Information—information system capability Human—no. of skilled employees Knowledge-expertise & know-how Relational—long-term contracts with customers 	<i>Objectivity/transparency</i> <ul style="list-style-type: none"> For quantitative data there is less issue on objectivity For ambiguous categories (e.g. knowledge vs. information), clear decision rules are defined. Information system that only stores and transfers information is not categorised as knowledge; Information system with decision support is qualified as knowledge All categorisations are recorded in excel spreadsheet for ensuring transparency (see Appendix A for summary)
	<i>Other indefinite categories</i> <ul style="list-style-type: none"> Others (if any) 	<i>Validity</i> <ul style="list-style-type: none"> All indicators & pre-defined categories are based on the theoretical framework & resource-based view Mutual exclusiveness, independence and exhaustiveness of categories are ensured by the definite and indefinite categories shown in this table Category development is fine-tuned during the coding process when pre-determined categories were not exhaustive. More codes for resource bundling were later introduced
Resource bundling strategy	<i>Definite categories</i> <ul style="list-style-type: none"> Integration of resources Information technology Complementary resources 	<i>Reliability</i> <ul style="list-style-type: none"> Reliability of coding instrument is ensured by pre-defined decision rules & the use of multiple coding periods and two coders Random cross-coding and systematic cross-coding by the two coders yielded minimal discrepancy
	<i>Other indefinite categories</i> <ul style="list-style-type: none"> Asset management units 	
Competitive advantages	<i>Definite categories</i> <ul style="list-style-type: none"> Long-term profit growth Long-term revenue growth Length/continuity of contracts 	
	<i>Other indefinite categories</i> <ul style="list-style-type: none"> There is no other indefinite category 	

^a Refer to Section 2.3 for definitions of different types of resources.

to the content analysis. To ensure a high level of objectivity and transparency, clear decision rules are pre-defined to avoid ambiguous categorisation (Cullinane and Toy, 2000; Krippendorff, 1980). For example, an information system that only stores and transfers information is not categorised as knowledge resources whereas an information system with decision support is qualified as knowledge resources. The exclusiveness, independence and exhaustiveness of categories (Cullinane and Toy, 2000; Guthrie et al., 2004) are ensured by pre-defining definite and indefinite categories as shown in Table 1. Since category development needs to be fine-tuned during the coding process when pre-determined categories were not exhaustive (Cullinane and Toy, 2000), several new categories for resource bundling were added. Finally, the reliability of the coding instrument is ensured by the pre-defined decision rules and the use of multiple coding periods and two coders. Random cross-coding and systematic cross-coding

by the two coders yielded minimal discrepancy indicating that the instrument is highly reliable.

3.4. Limitations of content analysis

Even though content analysis appears to be suitable for this research it has a number of limitations. Firstly, company profiles written by Datamonitor did not contain all the information required for this research. Even though Datamonitor provided accurate and comprehensive information regarding different types of resources, information concerning knowledge and relational resources are not as comprehensive as required. Therefore, the understanding of knowledge resources, which are often hard to set down in writing, can be later complemented by research methods such as case study, focus group, and interview. Secondly, since the company profiles were written to

provide general information concerning a company they had not, on some occasions, specifically explained the idiosyncratic characteristics of different resources. Thirdly, the company profiles were not designed to analyse factors which lead to competitive advantage of the company. Thus, in some instances, the relationships between different resources and performance are not clearly stated. Due to these limitations some of the results of this research may not be conclusive.

4. Findings

This section presents key findings pertaining to the three research questions. The findings are summarised in four appendices. Appendix A summarises resources accessed by each of the 15 LSPs. Appendix B highlights different types of resources (and their characteristics) accessed by all the LSPs. Appendix C provides examples of how LSPs bundled resources. Appendix D summarises the long-term financial performances for each of the 15 LSPs.

4.1. Logistics resources accessed by the LSPs

Overall, a lot of relevant information is extracted from the databases of company profiles. Somehow information regarding knowledge and relational resources for some LSPs is incomplete. However, the available data show that, for whatever reasons, all LSPs attempted to gain access to physical, human, information, knowledge, and relational resources.

Physical resources: The most common physical resources accessed by the 15 LSPs are logistics service centres, logistics hubs, warehouses, land, road vehicles, and aircraft. Most of the studied LSPs perceived physical resources as one of the most important resources because they are required to create the “network coverage” advantage (called “global reach” by DHL). The results also show that the lack of access to physical resources could be a hurdle to securing new contracts (see K+N case in Appendix B). Network coverage is not easily replicable; it needs an investment of time and capital to succeed. However, some asset-light service providers (e.g. Expeditors and Panalpina) avoided ownership of physical resources such as aircraft, road vehicles, and warehouses and they chose to acquire only a limited number of logistics service centres. In order to achieve global network coverage, these asset-light service providers set up alliances or contracts with asset-based service providers. Since no LSP can possibly own all required physical resources, they cooperated with multiple service providers in order to fulfil the customer demands (Das and Teng, 2000). This finding confirms the argument of Lieb and Bentz (2005) concerning the need to cooperate with other service providers.

Information resources: From the content analyses it is apparent that all LSPs have been continuously developing their firm-specific information systems or gaining access to various information technologies and systems to improve the following capabilities: (1) the ability to provide information for customer to track and trace shipments; (2) the ability to automate processes such as invoicing,

custom documentation, and reporting; and (3) the ability to integrate with customers’ information systems. Many LSPs (e.g. DHL, UPS, K+N) have attempted to develop information systems that offer the first two common capabilities. The third capability, i.e. the ability to link information and data with other parties (Gattorna et al., 2004), was less common and therefore it should be regarded as a rare competence (Lewis and Talalayevsky, 2000). Only a few LSPs (e.g. UPS and DHL) are able to develop such information resources (see Appendix B).

In order to exploit the competitive advantages of information resources, all 15 LSPs attempted to develop their own information systems in-house and also engaged in partnership and alliance and even acquisition of technology companies (see Appendix B). Proprietary technologies are often harder to imitate (Mata et al., 1995). Other efforts in strengthening information resources are the use of wireless technology and the use of radio frequency identification (RFID) technology to warehouse management systems, and transportation management systems (e.g. Ryder Systems and Wincanton). In reality most LSPs have been trying to achieve competitive advantage by developing proprietary information resources because they aim to become the unique providers of application services instead of the typical logistics services.

Human resources: Human resources (skilled workforces) are another key resource acquired or accessed by all the 15 LSPs. Skills and experience in transportation management, warehouse management, customer service and information system management are the often mentioned logistics-specific skills. Also, human resource could be acquired alongside the acquisition of physical resources. Especially for LSPs actively engaged in merger and acquisition (e.g. Exel, DHL, FedEx), skilful and knowledgeable employees were particularly important for the extension of network coverage and service offerings. These skilful human resources were also being accessed via joint-ventures and alliances because these strategies complement the experiences of existing human resources (see Appendix B). Alternately, other evidence indicates that some LSPs (e.g. Exel and DHL) attempted to hire experts from other industrial sectors to join the top management boards. This strategy has indirectly allowed for the success in securing logistics contracts in various industrial sectors. As argued by previous literature (Prahalad and Hamel, 1990; Grant, 1996b; Drew and Smith, 1998; Hunt, 2001; Ellinger et al., 2002; Panayides, 2007), the evidences collected indicate that it is not the number of employees that matter; it is the competence and knowledge of human assets that deliver outstanding service and customer satisfaction.

Knowledge resources: The content analysis shows that expert knowledge is becoming a unique resource for LSPs which is hard to imitate and substitute. The hiring of expertise from other industrial sectors mentioned earlier was a crucial strategy to access to knowledge of various industries (customers’ supply chains). Other identified knowledge areas include the abilities to optimise logistics networks, apply logistics technology, and manage supply chain management/transformation. Asset-based service providers (e.g. FedEx, UPS and DHL) admitted that knowledge of the customer is the key to success. To build up

idiosyncratic knowledge resources, several LSPs (e.g. FedEx, UPS, DHL; see Appendix B) even established education and research facilities or hired supply chain experts and acquired supply chain software so that they have the ability to perform complicated logistics routing, scheduling and network analysis, and supply chain planning. Such capabilities are embedded in the human resources and organisational routines which are extremely hard to imitate (Lewis, 1995; Hunt, 2001; Mills et al., 2003). Knowledge resources were also critical for the asset-light service providers (e.g. Expeditors and Wincanton, see Appendix B). Even though all LSPs admitted that knowledge resources are the keys to competitive advantage, the content analyses show that none of them were particularly strong in this aspect.

Relational resources: The content analyses show that many LSPs have attempted to build up collaborative relationships with their customers. Collaborative relationships appeared to be the main reason for the success in winning new contracts and securing long-term or continuity of contracts. A number of LSPs (e.g. UPS, Wincanton, K+N, see Appendix B) were able to become the official logistics providers of some large customers due to their close relationships. Close relationships appeared to lead to extension of contracts and further strengthen the expertise of these LSPs and therefore their reputations in particular industrial sectors. Once long-term relationships are established, the asset-specific investments and knowledge of customers' operations acquired by LSPs appeared to become the distinctive capabilities appreciated by the customers. Relational resources were also established via horizontal alliances because LSPs realised the need to cooperate with other service providers (Lieb and Bentz, 2005). A number of such alliances (e.g. K+N with Wincanton) are found to jointly compete with other competitors in the retail sector. The acquisition of horizontal relational resources

was not only useful for access to customers, it was also a quick-win strategy to swiftly access to physical, information and knowledge resources with relatively low financial investment.

In summary, all 15 LSPs have attempted to gain access to different resources at different levels. They were building up different resource profiles, as predicted by our theoretical framework. Fig. 2 provides a clear distinction between the two typical resource profiles identified in this research. The first resource profile consists of those with a low level of physical and human resources but a medium level of information, knowledge and relational resources (e.g. Panalpina, Expeditors, and K+N). Some of these LSPs (e.g. Panalpina and Expeditors) had clearly declared in their strategic statements that they would never possess a high level of physical resources. The second profile consists of those with a higher level of physical and human resources and medium levels of information, knowledge and relational resources (e.g. DHL, FedEx and UPS). This finding is similar to the resource framework suggested by Das and Teng (2000), which divides a firm's resources into property-based resources (including physical and human resources) and knowledge-based resources (including knowledge, technology and managerial expertise).

4.2. How different resources are bundled together?

There are perhaps many answers to this question. However, from the content analyses this article identifies five resource bundling strategies.

1. *Acquire resources and integrate them quickly:* Some LSPs (e.g. DHL, K+N, Wincanton) acquired new resources and

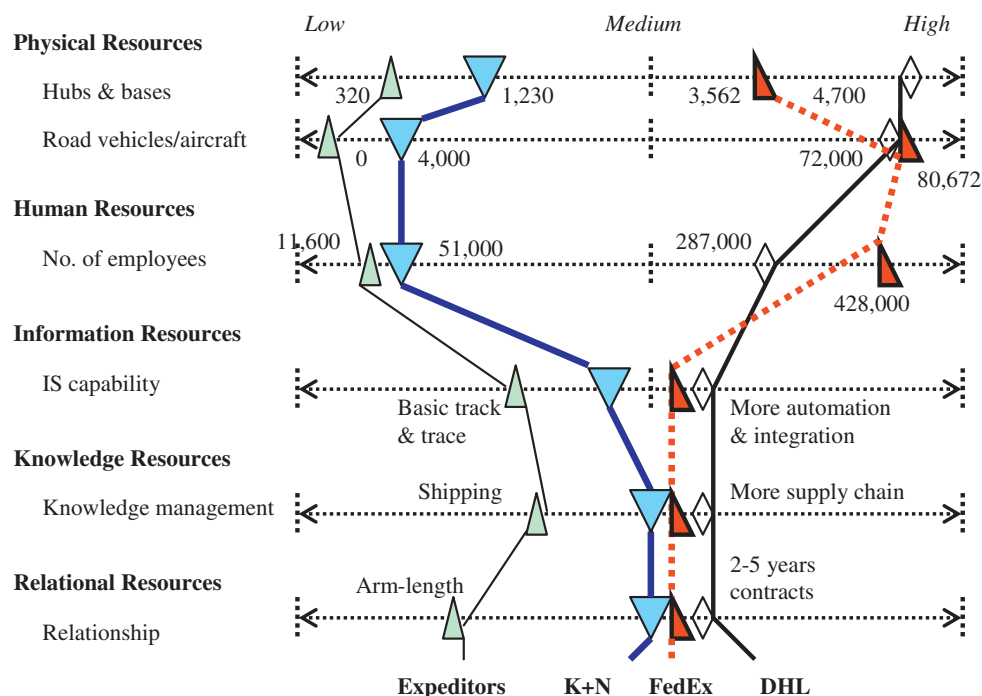


Fig. 2. Resource profile.

then quickly integrated them with the existing resources. To offer customised logistics solutions, these LSPs integrated together resources from different business units including express, freight, forwarding and warehouse businesses. A number of LSPs specialising in air freight express managed to integrate their physical resources from both air freight and logistics business units quickly in order to win new contracts (see Appendix C). Conversely, there is evidence suggesting that a lack of integrated resources could hinder competitiveness (see Appendix C). On the other hand, the increasing needs for integrated logistics services appeared to drive many LSPs to possess the capabilities to integrate their air, sea and road services as well as national and regional resources together (see Appendix C).

2. *Develop information system to integrate resources and activities with customers and suppliers:* A number of LSPs developed software which can be easily connected with customers' information resources so that customers are able to order shipping services directly from their own information systems. Furthermore, web-based track and trace information systems were developed to connect LSPs's information resources with customers and freight operators (see Appendix C). Some LSPs even managed to connect their logistics information system with customers' manufacturing functions. Due to the lack of expertise in information technology (knowledge resources), some LSPs (e.g. FedEx and UPS) partnered with universities (see Appendix C). Some LSPs (e.g. DHL) even attempted to develop "intelligent" supply chain software which possesses the unique capability to perform supply chain optimisation using real-time information on behalf of the customers (see Appendix C).
3. *Establish an asset (resource) management unit:* To provide an efficient access to physical resources, many LSPs (e.g. K+N and Nippon Express, Appendix C) established new divisions to manage their real estates (such as warehouses, distribution centres, hubs, cross-docking facilities, and offices). Such real-estate divisions have been continuously acquiring lands close to seaports and airports or major international logistics hubs. They also disposed of some physical assets that became less strategic. This arrangement enabled the core business units (contract logistics) to focus on doing what they are good at, and avoid being burdened by low-liquidated assets, especially during an economy downturn.
4. *Complement the value of a resource with another resource:* This research discovers many examples of how resources are complementing each other (Appendix C). In some instances, realising the fact that physical resources are heterogeneously distributed and imperfectly mobile, some LSPs established horizontal alliances (e.g. Wincanton and Kerry Logistics) so that they could complement each others physical resources located at two different geographical areas and further gained competitive advantage in international logistics. Without these alliances, the resources possessed by either party would not be competitive in this business

opportunity. Furthermore, the content analyses revealed that investment in knowledge resources could lead to the building up of relational resources, and vice versa (see Appendix C). In-depth knowledge of a customer's operations is a valuable and non-substitutable resource which further increases the inter-dependency between LSPs and their customers. In return, closer and longer-term relationship then further allow LSPs to further understand customers' businesses.

5. *Disposal of less strategic resources:* The content analyses discover that logistics markets in the US and Europe are saturating while there is stronger growth in the emerging markets such as Asian and Eastern European countries (see Appendix C). Since some of the physical, information, knowledge, human resources, and relational resources accessible in the US and European markets were simply not transferable to other continents some LSPs appeared to dispose of some of these resources and invested new facilities in countries such as China, India, Brazil, and Eastern European countries. This appeared to be common for all LSPs particularly those facing financial difficulties. For LSPs with limited financial resources, acquisition of new resources appeared to be a problem and disposal of non-profitable assets were useful to provide new funding for access to new resources elsewhere.

Though this research discovers various ways to bundle logistics resources, there are evidences suggesting that most LSPs are struggling with the integration of various resources in a wide geographical area. The answers about resource bundling (exploitation) provided by this research may not be comprehensive; however, they are valuable because they can be used to form theoretical propositions which are grounded by empirical evidences for further research.

4.3. Characteristics of resources accessed by successful LSPs

The competitiveness of a LSP may be measured by their offering such as price, frequency, capacity, schedule service, ability to track packages, extent of geographic coverage, reliability, and innovative service offerings (Rafiq and Jaafar, 2007). Alternately, long-term financial performances (e.g. revenue and profit) are chosen in this research because they are the ultimate indicators of competitive advantage. The limitation of this choice of dependent variables is that it does not consider the fact that performance advantage is competitively unstable and the relationships among different performance measurements are causally complex (March and Sutton, 1997). Thus, the possession of some firm-specific resources may not necessarily directly lead to revenue growth or profitability. The results of this analysis are, thus, indicative and further studies are required to reach more conclusive results.

As summarised in Appendix D, the content analyses confirm that not all LSPs managed to achieve high revenue and profit (Min and Foo, 2006), which supports the arguments of resource-based competitive advantage put forwarded by Penrose (1959) and Barney (1991). In terms

of the long-term revenue and profitability performance, the 14 LSPs (excluding Penske, a privately owned company, due to inadequate financial data) can be divided into four categories:

1. Successful LSPs with medium or high levels of revenue and profitability growth. They are all asset-based (e.g. Schenker, Ryder, K+N, FedEx, and DHL).
2. LSPs with high revenue growth but low profitability growth (e.g. Expeditors, Wincanton, Kintetsu). They are mostly asset-light (e.g. Expeditors and Kintetsu). In fact, Wincanton and Kintetsu had average negative profits.
3. LSPs with low to medium revenue and profitability growth (e.g. Exel, Nippon Express, Yamato, UPS, and Panalpina). In this category, only Panalpina is asset-light. In fact, Exel and UPS had average negative profits.
4. Unsuccessful LSPs with low revenue growth and low profitability growth (e.g. TNT).

In terms of asset possession, it appeared that the most successful LSPs (category 1) were mostly asset-based. However, the most unsuccessful LSP (e.g. TNT) also happened to be asset-based. In addition to financial performance, long-term contract or continuity of contract can be considered as another indicator of competitive advantage. Conversely, none of the asset-light LSPs were financially successful. It was possible for asset-light LSPs to achieve high revenue growth (e.g. Expeditors and Kintetsu) but none of them could achieve high profits. These findings indicate that the level of resource “possession” could be one of the explanatory factors for financial performance but it could not, consistently, warrant long-term financial success. Furthermore, there are a number of case examples (e.g. K+N and Wincanton) suggesting that continuity of contracts appeared to be largely contributed by idiosyncratic information, knowledge and relational resources. The long-term contracts reported in the company profiles appeared to be secured due to high levels of knowledge in supply chain solutions or customers’ operations, ability to offer shorter lead time, and the ability to offer multiple integrated logistics services.

Based on the company profiles of the LSPs in the categories 1 and 2 above, this research concludes the following common characteristics of the financially successful LSPs: (1) they all possessed medium to high levels of physical, human, information, knowledge and relational resources; (2) they were serious and ahead in developing firm-specific information resources; (3) they were all serious in attracting and integrating unique human resources from other sectors and integrating different resources together effectively; (4) they went extra miles by investing in knowledge creation (research) and management systems to achieve firm-specific and knowledge-based competitive advantages; (5) they all managed to establish long-term relationships with key customers as well as creating horizontal alliances with other LSPs; (6) some of them established specific asset management units to manage their physical resources; (7) they had the competence to complement their own resources with the resources of other functions or business partners (i.e. to

bundle resources that are heterogeneously distributed and imperfectly mobile together). These seven characteristics support the main premise of our theoretical framework, i.e., successful LSPs are those who are able to access valuable, rare, inimitable, non-substitutable resources and bundled these resources with some unique competences.

5. Discussion and implications

This article identifies the five strategic resources (e.g. physical, human, information, knowledge and relational resources) accessed by the studied LSPs. These findings are valuable for the development of the constructs of logistics resources and their measurement scales. Physical resources include tangible assets required to perform logistics tasks; they are for example logistics service centres, logistics hubs, warehouses, lands, road vehicles, and aircraft (Closs and Thompson, 1992; Karia and Razak, 2007). They are valuable, but often imitable and sometimes substitutable; therefore they do not warrant competitive advantage. However, when physical resources are made useful, they can be conceptualised as capabilities such as network coverage (Persson and Virum, 2001) and service portfolio (Bask, 1999).

From the content analyses, human resources were often referred to as workforces who are skilful and experienced in performing logistics tasks, and more importantly building up and maintaining customer relationships. Both general managerial skills and specific logistics skills were mentioned in the company profiles, which corresponded with the work of Myers et al. (2004) and Murphy and Poist (1991, 2007). The HRM literature (Wright et al., 1994) tends to distinguish human resources (skilled workforces) from knowledge resources. However, this research ascertains that human and knowledge resources are sometimes two inseparable strategic resources. Many experts hired by LSPs also happened to possess unique knowledge about different industrial sectors as well as established relationships with the LSPs’ customers. Though skilful workforces are valuable, they are sometimes imitable (by hiring experts from other companies) and therefore do not warrant competitive advantage.

Both physical and human resources require other resources to make them useful (Rubin, 1973; Mahoney and Pandian, 1992). From the content analyses, information, knowledge and relational resources appeared to be applied to make physical and human resources useful (by bundling them in some specific manners). However, these resources are intangible and more difficult to operationalise. The IT literature tends to break down the construct into several components such as spending, technical skills, generic IT, shared knowledge, and infrastructure (Mata et al., 1995; Bharadwaj, 2000; Ray et al., 2005) but does not consider the characteristics of these components. Instead, capabilities such as track and trace and process automation are common requirements in any logistics contracts (Hammant, 1995) but the ability to integrate with the information resources of other parties is more unique. Therefore, it appeared to the LSPs that it is more useful to conceptualise information resources in terms of

capabilities, i.e. the capabilities of information system to integrate with internal and external processes (Lewis and Talalayevsky, 2000).

Based on the above argument, this article suggests conceptualising knowledge resources as the abilities to gaining access to, and bundling of valuable and rare resources (especially physical, information and human resources) to create inimitable and non-substitutable capabilities (Prahalad and Hamel, 1990; Barney, 1991; Grant, 1996b). Knowledge resources may be originated from human resources and they are also embedded in the organisational routines; they are inherently tacit and casually ambiguous (Reed and DeFillippi, 1990). Thus, firm-specific knowledge resources (such as supply chain knowledge for some specific industrial sectors) are immobile, costly to imitate, and difficult to be substituted (Barney, 1991).

From the content analyses, all LSPs recognised the strategic value of relationship. Collaboration is often considered as the ultimate core capability in a supply chain (Min et al., 2005) and it relies heavily on relationship. Due to the importance of long-term contracts, the abilities to build and maintain long-term working relationships with key suppliers and customers are recognised as the basis of relational resources. Relational resources can also be exploited to make other resources useful. For example, relationship is the key to achieve resource complementarity among business partners (Amit and Schoemaker, 1993). Information technology (IT) promotes both internal and external collaboration (Sanders and Premus, 2005). However, as discovered by this research, IT can support collaboration but not replace it because collaboration is a result of human relations (Sanders and Premus, 2005).

Previous literature has highlighted the need for the knowledge on how resources can be exploited or bundled them to create useful capabilities (Rubin, 1973; Barney, 1991; Mahoney and Pandian, 1992; Sirmon et al., 2007). Sirmon et al. (2007) have suggested the need to “integrate” resources to create unique capabilities and “leverage” these capabilities to achieve competitive advantage. This research further reveals detailed means to which resources can be integrated and capabilities can be leveraged. First of all, different physical and human resources can be combined together to build different network coverage and service portfolios. The ability to integrate various human, physical and information resources from a heterogeneously distributed and imperfectly mobile network of resources to provide integrated solutions appears to become the winning competence. This means the decision to acquire particular resources should be based on the potential network coverage and service portfolios that can be built based on the new combined resources. Therefore, LSPs need to create a special organisational unit to take into account the future network coverage and service portfolios required, and overlook the structuring and acquisition of resources. The establishment of an asset management unit to acquire and dispose of physical resources is perhaps a good starting point, but its scope has to be extended to include human resources, knowledge resources and relational resources.

To effectively bundle various resources together LSPs also need to improve their abilities mobilising, coordinating and deploying different resources (Sirmon et al., 2007). Particularly, it is important to understand the causal relationships between different resources. For example, information resources are essential to integrate physical and human resources together. Furthermore, relational resources are required to effectively pull different resources together to enable collaboration. Without relational resources information resources cannot reach their full potential (Sanders and Premus, 2005). Also, knowledge resources and relational resources reciprocally strengthen each other. The knowledge of customers' operations is very important for improving service quality and exclusive knowledge of customers' operations will also certainly help to extend service contracts. Long-term relationships will allow for the acquisition of more exclusive knowledge of the customers.

The above discussions of the findings lead to the conclusion that resources structuring and bundling are the pathway to competitive advantage, as indicated by the theoretical framework. These two processes appeared to transform existing resource profiles of a LSP to a more competitive one. From the content analyses, successful LSPs appeared to be more effective in these two processes. Furthermore, among the seven characteristics of resource management process identified by this research, it appeared that most successful LSPs put relatively more emphasis on building up information, relational and knowledge resources. These characteristics, of successful LSPs, can perhaps form the basis of theoretical propositions for further research.

Every research method has its limitations, so does this research. First of all the applied content analysis can only be as good as the documents (Scott, 1955). Even though the chosen company profiles compiled by Datamonitor contained authentic and credible data, some information was not available. Also, problems were encountered when the aim was to impute latent rather than manifest content from the documents (Bryman and Bell, 2007). In several instances, it was almost impossible to devise coding manuals that did not entail some interpretation on the part of codes. While data of the selected company profiles included various activities that were aimed to access particular resources, it was not always possible to ascertain the answers to the “why” questions through content analysis. Whenever such explicit explanations could not be found, some interpretations according to the pre-defined rules were inevitably required. These limitations can be addressed by case study research in the future. Nevertheless, the definitions of logistics resources, theoretical framework, and research protocol established by this article can be replicated to perform case study or survey research to further build and test the resources-based theory of LSPs' competitive advantages. Another limitation is that the choice of financial performance indicators such as revenue growth and profit as dependent variables may not be the best way to explain the roles of logistics resources; instead, process performance was found to be a more appropriate dependent variable (Ray et al., 2004).

6. Conclusion and further research

This research analyses empirical evidences in order to explain the competitive advantages of logistics service providers. The research draws theoretical foundations from the resource-based view (RBV) theory and relevant logistics literature to establish a theoretical framework which comprises of resource structuring, access and bundling as the main stages of achieving resource-based competitive advantages. The research identifies five strategic resources (i.e. physical, human, information, knowledge, and relational resources) and their characteristics. Based on these findings the conceptualisation and measurement of these resource constructs are clarified.

In addition to gaining access to idiosyncratic (valuable, rare, inimitable, non-substitutable) resources, this research reveals that it is also important for LSPs to build up the ability to structure a resource portfolio and bundle resources to create competitive capabilities. Guided by the resource-based view (RBV) theory, this research identifies five approaches which are applied to bundle (or exploit) the strategic resources in order to create competitive advantages. Further supported by sound financial

performance, the research identified seven characteristics of resource access and bundling which may form theoretical propositions for future investigation. Since much of the third-party logistics literature lacks theoretical foundations (Maloni and Carter, 2006), this research contributes to the development of theoretical-driven framework and propositions for further research. Furthermore, this research represents some of the novel efforts in understanding the competitive advantages of LSPs from the providers' resources perspectives, unlike the vast majority of other previous studies which focused on the users' perspective.

However, this research has not fully identified the approaches to bundle strategic resources to achieve competitiveness. It is believed that there are still some missing links between resources possession and resource exploitation. This is mainly due to the limitation of the applied research method (content analysis) and the available data. More empirical evidences about knowledge, information and relational resources and other approaches of resource bundling are needed. Other research methods such as case study, focus group and survey shall be applied to further developing and testing relevant theoretical constructs and propositions.

Appendix A. Summary of data on strategic resources

LSP	Resources	Summary of data extracted from content analysis
Schenker (asset-based)	Physical Human Information Knowledge Relational	1500 locations; 17,270 road vehicles; 24,160 swapbodies 54,905 employees; skilled and non-skilled Track and trace, shipment booking (e-Schenker Portal, BridgePoint) Knowledge in lowering emission and road/rail transportation Main customers are ABB, Shell, Miele, etc.
Ryder (asset-based)	Physical Human Information Knowledge Relational	159,400 road vehicles, 836,100 m ² warehouse space 28,800 employees; skilled and non-skilled Ryder FleetCare (track and trace), logistics management suite (automation) Logistics management suite for routing optimisation GM as main customer (42% revenue), top 10 at 69% revenue
K+N (asset-based)	Physical Human Information Knowledge Relational	400 warehouses; 830 bases; 4000 road vehicles 51,000 employees; skilled and non-skilled; experienced management Web- and PC-based track and trace "KN Login"; process automation WMS connected to ERP and transport planning Partner with Wincanton; contract duration 4 years
FedEx (asset-based)	Physical Human Information Knowledge Relational	40 hubs; 3522 bases; 80,000 road vehicles; 672 aircraft 428,000 employees; skilled and non-skilled; experienced management Web and PC-based track and trace; connect MSOutlook, process partial automated FedEx Institute of Technology for education and research Some long-term contracts with Airbus/Boeing
TNT (asset-based)	Physical Human Information Knowledge Relational	2331 hubs, 26,760 road vehicles; 47 aircraft 139,222 employees; skilled and non-skilled; experienced management PC-based track and trace; partially process automation Ranked 3rd world's most admired companies for "delivery" Mutual investment with Denso
UPS (asset-based)	Physical Human Information	215 hubs; 3000 bases; 122,910 road vehicles; 322 aircraft 425,300 employees; skilled and non-skilled Web- and PC-based real-time track and trace; process automation

	Knowledge Relational	Demand and supply rout transport and accounting system Several 5-year contracts
DHL (asset-based)	Physical Human Information Knowledge Relational	36 hubs; 4700 bases; 72,000 road vehicles; 350 aircraft 287,000 employees; skilled and non-skill; hired experienced experts Web- and PC-based track and trace; process automation “Guru” knowledge management, “Quintiq” planning & scheduling Several 2–5 years contracts
Exel (asset-based)	Physical Human Information Knowledge Relational	2500 distribution centres; 1570 road vehicles 111,300 employees; skilled and non-skilled; hired experienced experts Web-based track and trace “iCIS” Knowledge about many sectors; acquired skilled people from M&A 65% new contracts from existing clients; average contract duration 4 years
Yamato (asset-based)	Physical Human Information Knowledge Relational	197 hubs; 12,159 bases; 51,386 road vehicles 157,653 employees; skilled and non-skilled Online freight “NEKO” Total System; “i-CAT invoice” <i>No data</i> <i>No data</i>
Panalpina (non-asset based)	Physical Human Information Knowledge Relational	500 bases 15,301 employees; skilled and non-skilled Web- and PC-based track and trace; process partially automated No knowledge management system Mostly arm-length customer base
Expeditors (non-asset based)	Physical Human Information Knowledge Relational	No hubs; 320 facilities; no road vehicle; no aircraft 11,600 employees; skilled and non-skilled Web- and PC-based track and trace; process partial automated Shipping; use of “Tradeflow” calculate landed cost Main customers in manufacturing, retail and wholesale
Penske (asset-based)	Physical Human Information Knowledge Relational	300 warehouses; 12,000 road vehicles 20,000 associates; skilled and non-skilled Web- and PC-based track and trace (Gateway; Fleet InSite), GPS <i>No data</i> Main customers in automotive, retail and other industries
Wincanton (asset-based)	Physical Human Information Knowledge Relational	11,800 vehicles, 1.9 millions ft ² warehouse space 30,000 employees (in Europe); skilled and non-skilled Web- and PC-based track and trace; RFID and voice-pick <i>No data</i> Main customers in many sectors in the UK; long-term contracts
Kintetsu (non-asset based)	Physical Human Information Knowledge Relational	259 bases 7762 employees; skilled and non-skilled <i>No data</i> Knowledge in electronics supply chains <i>No data</i>
Nippon Express (asset based)	Physical Human Information Knowledge Relational	300 service centres 38,300 employees; skilled and non-skilled Real-time track and trace “VDS”, “SKY-NET”, “NEXT21” <i>No data</i> <i>No data</i>

Appendix B. Accessed resources and their characteristics

Types of resources & characteristics	Examples from the content analysis
<p><i>Physical resources:</i> Logistics service centres, logistics hubs, warehouses, land, road vehicles, and aircraft</p> <p><i>Characteristics:</i> Unique network coverage-not easily replicable (it needs time and capital)</p>	<ol style="list-style-type: none"> 1. K+N: generated its revenues from mainly sea freight, but due to limited physical resources (vessels and terminals) it experienced disadvantages against other asset-based sea-freight operators such as A.P. Møller-Maersk; 2. Panalpina: with only 500 offices in 90 countries, it was able to operate in 60 more countries by partnership with other service providers.
<p><i>Human resources:</i> Skills and experience in transportation management, warehouse management, customer service and information system management</p> <p><i>Characteristics:</i> Skilled and experienced staff from logistics industry and customers' industries; also complementary to other resources</p>	<ol style="list-style-type: none"> 1. Exel, DHL, FedEx: merger and acquisition; 2. Wincanton and Kerry Logistics: alliance; 3. Exel and DHL: attempted to hire experts from other industrial sectors.

Information resources: Ability to provide information, automate processes, and integrate with customers' information systems, e.g. "Easyship Professional" (DHL), shipping tool for eBay marketplace (UPS), and "Logistar" (K+N)

Characteristics: Proprietary technologies which are hard to imitate

Knowledge resources: Knowledge in logistics, international trade, information technology and software, supply chain management and transformation

Characteristics: Privately owned education and research centres and knowledge embedded in human resources, information resources and organisational routines

Relational resources: Exclusive and long-term trustworthy relationships leading to long-term contracts with key customers; also horizontal (complementary) alliances to compete with other competitors

Characteristics: Knowledge of customer and asset-specific investments which other competitors to highjack the contracts; combined capabilities via horizontal alliances

1. UPS: connected its logistics information system to manufacturers using the "Manufacturing Operating System" supplied by Pelion;
2. K+N: acquired ACR logistics in order to access technology that enhanced the functionalities of "Logistar" which was originally installed for over 400 customers at 100 locations in 40 countries but since the acquisition of CR more countries and industry sectors were included.

1. FedEx: deliberately built the FedEx Institute of Technology for the purpose of education and research of technological solutions for the logistics industry;
2. UPS: established a logistics campus to support the development of knowledge resources for its supply chain solution division;
3. DHL: hired supply chain experts and acquired supply chain software such as "GURU Knowledge Management System" and "Quintiq Real-time Planning & Scheduling Solution" in order to perform complicated logistics routing, scheduling and network analysis, and supply chain planning;
4. Expeditors: developed software called "Tradeflow" which allowed importers and exporters to calculate landed cost for the international trade exchange;
5. Wincanton: relied heavily on knowledge resources which provide customised one-stop management solution.

1. UPS was able to become the official logistics provider for eBay marketplace because of its close relationship with eBay;
2. Wincanton's 6-year relationship with Comet (an electrical retailer) led to another 3-year contract. This relationship is further strengthened by Wincanton's expertise in the retail sector and their understanding of Comet's business;
3. K+N collaborated with Wincanton to form "KNW Retail Solutions" which jointly competed with other competitors in the retail sector.

Appendix C. Resource bundling strategies

Resource bundling strategies	Examples from the content analysis
1. Acquire resources and integrate them quickly.	<ol style="list-style-type: none"> 1. DHL: utilised its extensive express network (with 33 parcel centres and more than 720 pack-stations in 220 countries) for some of its logistics businesses. This capability to integrate resources have allowed some logistics service providers (e.g. DHL and K+N) to secure new contracts 2. DHL: Could not compete in the US market-DHL could not offer both full-truck-load (FTL) and loose-truck-load (LTL) to the customers due to the lack of an integrated network 3. Penske: created an alliance with ABX Logistics. 4. Wincanton initiated "One Wincanton" programme to ensure that the same high standards of customer care and operational excellence are consistently delivered across all operations.
2. Develop information system to integrate resources and activities with customers and suppliers.	<ol style="list-style-type: none"> 1. "Easyship Professional" (DHL) and "KN-Login" (KN) were developed for customers to order shipping services and connect these orders to their systems easily. 2. Panalpina and Expeditors developed web-based track and trace information systems to connect with the shippers and freight operators. 3. UPS connected its logistics information system to customers' manufacturing functions. 4. FedEx and UPS partnered with universities to develop information technology and system through research. 5. DHL invested massively in purchasing and developing intelligent supply chain software (e.g. "GURU" and "Quintiq") to enable the capability in setting up new logistics network and to provide supply chain solutions
3. Establish an asset (resource) management unit	<ol style="list-style-type: none"> 1. K+N real-estate division acted as landlords, leased logistics facilities to their contract logistics division.
4. Complement the value of a resource with another resource	<ol style="list-style-type: none"> 1. Exel & DHL: hired experts from different industries to complement existing human resources, or using merger and acquisition

2. Wincanton and Kerry Logistics established horizontal alliances so that they could complement each other physical resources and further gained competitive advantage at the UK–China logistics gateway.
3. In-depth knowledge of Comet's operations allowed for the extension of relationship between Wincanton and Comet.
5. Disposal of less strategic resources
1. Many LSPs disposed of assets in saturated markets and invested heavily in China, India, Brazil, and Eastern European countries

Appendix D. Summary of data on financial performance

LSP	Performance*	Level	Average (%)	Minimum (%)	Maximum (%)
Schenker (asset-based)	Revenue growth	High	13.4	0.0	46.3
	Profit growth	Medium	6.6	−33.6	31.2
Ryder (asset-based)	Revenue growth	Medium	6.6	0.5	11.5
	Profit growth	High	12.2	−2.8	45.5
K+N (asset-based)	Revenue growth	High	15.7	4.3	34.2
	Profit growth	Medium	3.5	−2.1	8.7
FedEx (asset-based)	Revenue growth	High	10.0	0.2	18.8
	Profit growth	Medium	6.4	−18.4	44.25
TNT (asset-based)	Revenue growth	Low	5.0	0.6	9.5
	Profit growth	Low	0.4	−14.7	7.3
UPS (asset-based)	Revenue growth	Medium	7.8	2.8	16.4
	Profit growth	Low (negative)	−11.7	−91.7	5.6
DHL (asset-based)	Revenue growth	High	19.9	20.0	128.0
	Profit growth	Medium	8.1	−41.3	117.5
Exel (asset-based)	Revenue growth	Medium	8.9	2.9	25.2
	Profit growth	Low (negative)	−10.7	31.3	−2.4
Yamato (asset-based)	Revenue growth	Medium	5.3	1.5	6.8
	Profit growth	Low	1.7	−21.1	25.8
Panalpina (non-asset based)	Revenue growth	Medium	8.0	−5.2	13.6
	Profit growth	Low	1.3	−10.8	30.2
Expeditors (non-asset based)	Revenue growth	High	15.8	−1.2	26.4
	Profit growth	Low	3.1	−5.1	16.4
Penske (asset-based)	Revenue growth	High	9.3	6.3	16.7
	Profit growth	No data	No data	No data	No data
Wincanton (asset-based)	Revenue growth	High	18.9	−1.8	68.4
	Profit growth	Low (negative)	−5.4	−23.1	7.3
Kintetsu (non-asset based)	Revenue growth	High	12.8	12.8	12.8
	Profit growth	Low (negative)	−2.5	−9.2	6.7
Nippon Express (asset based)	Revenue growth	Low	1.0	−3.0	5.2
	Profit growth	Medium	5.9	−11.2	30.8

Note: * Long-term average revenue and profit growth in percentages.

References

- Africk, J.M., Calkins, C.S., 1994. Does asset ownership mean better service?. *Transportation & Distribution* 35 (5), 49–61.
- Aldin, N., Brehmer, P., Johansson, A., 2004. Business development with electronic commerce: refinement and repositioning. *Business Process Management Journal* 10 (1), 44–62.
- Alshawi, S., 2001. Logistics in the internet age: towards a holistic information and process picture. *Logistics Information Management* 14 (4), 235–241.
- Amit, R., Schoemaker, P.J.H., 1993. Strategic assets and organizational rent. *Strategic Management Journal* 14 (1), 33–46.
- Barelson, B., 1952. *Content Analysis in Communication Research*. Free Press, New York.
- Barney, J.B., 1991. Firm resource and sustained competitive advantage. *Journal of Management* 17, 99–120.
- Barney, J.B., Arian, A.M., 2001. The resource-based view: origins and implications. In: Hitt, M.A., Freeman, R.E., Harrison, J.S. (Eds.), *The Blackwell Handbook of Strategic Management*. Oxford, pp. 124–188.
- Barney, J.B., 2001. Is the resource-based “view” a useful perspective for strategic management research? Yes. *The Academy of Management Review* 26 (1), 41–56.
- Bask, A.H., 1999. Third party relationships in logistics services. Thesis (Licentiate). Helsinki School of Economics and Business Administration, Helsinki.
- Beinstock, C.C., Royne, M.B., Sherrell, D., Stafford, T.F., 2008. An expanded model of logistics service quality: incorporating logistics information technology. *International Journal of Production Economics* 113, 205–222.
- Bettis, R.A., Hitt, M.A., 1995. The new competitive landscape. *Strategic Management Journal* 16, 7–19.
- Bharadwaj, A.S., 2000. A resource-based perspective on information technology capability and firm performance: an empirical investigation. *MIS Quarterly* 24 (1), 169–196.
- Brah, S.A., Lim, H.Y., 2006. The effects of techno and TQM on the performance of logistics companies. *International Journal of Physical Distribution & Logistics Management* 36 (3), 192–209.
- Brewer, P.C., Speh, T.W., 2000. Using the balance score card to measure supply chain performance. *Journal of Business Logistics* 21 (1), 75–94.

- Bryman, A., Bell, E., 2007. *Business Research Methods*. Oxford University Press, USA.
- Büyükoğuzkan, G., Feyzioğlu, O., Nebol, E., 2008. Selection of the strategic alliance partner in logistics value chain. *International Journal of Production Economics* 113 (1), 148–158.
- Carlson, L., 2008. Use, misuse, and abuse of content analysis for research on the consumer interest. *The Journal of Consumer Affairs* 42 (1), 100–105.
- Chiu, H.N., 1995. The integrated logistics management system: a framework and case study. *International Journal of Physical Distribution & Logistics Management* 25 (6), 4–19.
- Closs, D.J., Thompson, C.K., 1992. Logistics physical resource management. *Journal of Business Logistics* 13 (2), 269–283.
- Cullinane, K., Toy, N., 2000. Identifying influential attributes in freight route/mode choice decisions: a content analysis. *Transportation Research Part E* 36, 41–53.
- Das, T.K., Teng, B.-S., 2000. A resource-based theory of strategic alliance. *Journal of Management* 26 (1), 31–61.
- Daugherty, P.J., Theodore, P.S., Ellinger, A.E., 1998. Leveraging logistics distribution capabilities: the impact of logistics service on market share. *Journal of Business Logistics* 19 (2), 35–51.
- Drew, S.A.W., Smith, P.A.C., 1998. The new logistics management: transformation through organisational learning. *International Journal of Physical Distribution & Logistics Management* 28 (9/10), 666–682.
- Eisenhardt, K.M., Martin, J.A., 2000. Dynamic capabilities: what are they?. *Strategic Management Journal* 21 (10/11), 1105–1121.
- Ellinger, A.E., Lynch, D.F., Andzulis, J.K., Smith, R.J., 2003. B-to-B e-commerce: a content analytical assessment of motor carrier websites. *Journal of Business Logistics* 24 (1), 199–220.
- Ellinger, A.E., Ellinger, A.D., Keller, S.B., 2002. Logistics managers' learning environments and firm performance. *Journal of Business Logistics* 23 (1), 19–37.
- Ellinger, A.E., Ketchen, D.J., Hult, G.T., Elmadag, A.B., Richey, R.G., 2008. Market orientation, employee development practices, and performance in logistics service provider firms. *Industrial Marketing Management* 37, 353–366.
- Gattorna, J., Selen, W., Ogulin, R., 2004. Characteristics strategies and trend for 3PL/4PL in Australia. ALPHA Research Consortium, March 30, pp. 1–86 (Last accessed 24 Nov 2008). URL: < http://www.ciltuk.org.uk/download_files/laaresearch.pdf >.
- Grant, R.M., 1996a. Toward a knowledge-based theory of the firm. *Strategic Management Journal* 17, 109–122.
- Grant, R.M., 1996b. Prospering in dynamically-competitive environment: organizational capability as knowledge integration. *Organizational Science* 7, 375–387.
- Gubi, E., Arlbjørn, S.A., Johansen, J., 2003. Doctoral dissertations in logistics and supply chain management: a review of Scandinavian contributions from 1990 to 2001. *International Journal of Physical Distribution & Logistics Management* 33 (10), 854–855.
- Gunasekaran, A., Ngai, E.W.T., 2003. The successful management of a small logistics company. *International Journal of Physical Distribution & Logistics Management* 33 (9), 825–842.
- Guthrie, J., Petty, R., Yongvanich, K., Ricceri, F., 2004. Using content analysis as a research method to inquire into intellectual capital reporting. *Journal of Intellectual Capital* 5 (2), 282–293.
- Hammant, J., 1995. Information technology trends in logistics. *Logistics of Information Management* 8 (6), 32–37.
- Holsti, O.R., 1969. *Content analysis for the social sciences and humanities*. Perseus Publishing, New York.
- Hunt, S.D., 2001. Commentary: general theory of competition: issues, answers and an invitation. *European Journal of Marketing* 35 (5/6), 524–548.
- Innis, D.E., La Londe, B.J., 1994. Customer service: the key to customer satisfaction, customer loyalty and market share. *Journal of Business Logistics* 15 (1), 1–27.
- Itami, H., Roehl, T.W., 1987. *Mobilizing Invisible Assets*. Harvard University Press, Cambridge, MA.
- Karia, N., Razak, R.C., 2007. Logistics assets that payoff competitive advantage. In: Soliman, K.S. (Ed.), *Information Management in the Networked Economy: Issues & Solutions*. International Business Information Management Association, New York, pp. 33–39.
- Kahn, K.B., Mentzer, J.T., 1998. Marketing's integration with other departments. *Journal of Business Research* 42, 53–62.
- Krippendorff, K., 1980. *Content analysis: an introduction to its methodology*. Sage, Newbury Park, CA.
- Lai, F., Li, D., Wang, Q., Zhao, X., 2008. The information technology capability of third-party logistics providers: a resource-based view and empirical evidence from China. *Journal of Supply Chain Management* 44 (3), 22–38.
- Lai, K., Ngai, E.W.T., Cheng, T.C.E., 2005. Information technology adoption in Hong Kong's logistics industry. *Transportation Journal* 44 (4), 1–9.
- Langley, J., Capgemini, 2007. The state of logistics outsourcing: 2007 third-party logistics. In: 12th Annual study of third party logistics. Third Party Logistics.
- Larson, P.D., Kulchitsky, J.K., 1999. Logistics improvement programs: the dynamics between people and performance. *International Journal of Physical Distribution & Logistics Management* 29 (2), 88–102.
- Lewis, M.A., 1995. *Competence analysis and the strategy process*. PhD Thesis, University of Cambridge, Cambridge.
- Lewis, I., Talalayevsky, A., 2000. Third-party logistics: leverage information technology. *Journal of Business Logistics* 21 (2), 173–185.
- Lieb, R., Bentz, B.A., 2005. The use of third-party logistics services by large American manufacturers: the 2004 survey. *Transportation Journal* 44 (2), 5–15.
- Maloni, M.J., Carter, C.R., 2006. Opportunities for research in third-party logistics. *Transportation Journal* 45 (2), 23–38.
- Mahoney, J.T., Pandian, J.R., 1992. The resource-based view within the conversation of strategic management. *Strategic Management Journal* 13, 363–380.
- March, J.G., Sutton, R.I., 1997. Organizational performance as a dependent variable. *Organization Science* 8 (6), 698–706.
- Mata, F.J., Fuerst, W.L., Barney, J.B., 1995. Information technology and sustained competitive advantage: a resource-based analysis. *MIS Quarterly* 19 (4), 487–504.
- Mentzer, J.T., Foggin, J.H., Golicic, S.L., 2000. Collaboration: the enablers, impediments and benefits. *Supply Chain Management Review* 4 (4), 52–58.
- Min, H., Foo, S.F., 2006. Benchmarking the operational efficiency of third party logistics providers using data enveloped analysis. *Supply Chain Management: an International Journal* 11 (3), 259–265.
- Min, S., Roath, A.S., Daugherty, P.J., Genchev, S.E., Chen, H., Arndt, A.D., Richey, R.G., 2005. Supply chain collaboration: what's happening?. *The International Journal of Logistics Management* 16 (2), 237–256.
- Miller, D., Shamsie, J., 1996. The resource-based view of the firm in two environments: the Hollywood film studios from 1936 to 1965. *Academy of Management Journal* 39, 519–543.
- Mills, J., Platts, K., Bourne, M., 2003. Applying resource-based theory: methods, outcomes and utility for managers. *International Journal of Operations & Production Management* 23 (2), 148–166.
- Murphy, P.R., Poist, R.F., 2007. Skill requirements of senior-level logistics: a longitudinal assessment. *Supply Chain Management: an International Journal* 12 (6), 423–431.
- Murphy, P.R., Poist, R.F., 2000. Third-party logistics: some user versus provider perspectives. *Journal of Business Logistics* 21 (1), 121–133.
- Murphy, P.R., Poist, R.F., 1998. Third-party logistics usage: an assessment of propositions based on previous research. *Transportation Journal* 37 (4), 26–35.
- Murphy, P.R., Poist, R.F., 1991. Skill requirements of senior-level logistics executives: an empirical assessment. *Journal of Business Logistics* 12 (2), 73–94.
- Myers, M.B., Griffith, D.A., Daugherty, P.J., Lusch, R.F., 2004. Maximizing the human capital equation in logistics: education, experience and skills. *Journal of Business Logistics* 25 (1), 211–232.
- Newbert, S.L., 2007. Empirical research on the resource-based view of the firm: an assessment and suggestions for future research. *Strategic Management Journal* 28 (2), 121–146.
- Novack, R.A., Rinehart, L.M., Wells, M.V., 1992. Rethinking concept foundation in logistics management. *Journal of Business Logistics* 13 (2), 233–267.
- Olavarrieta, S., Ellinger, A.E., 1997. Resource-based theory and strategic logistics research. *International Journal of Physical Distribution & Logistics Management* 27 (9/10), 559–587.
- Panayides, M.P., So, M., 2005. The impact of integrated logistics relationships on third party logistics service quality and performance. *Maritime Economics and Logistics* 7, 36–55.
- Panayides, M.P., 2007. Effects of organizational learning in third-party logistics. *Journal of Business Logistics* 28 (2), 133–159.
- Park, C., 2005. Complaints of Asia shoppers towards global retailer: a content analysis of e-complaining to Carrefour Korea. *Asia Pacific Journal of Marketing and Logistics* 17 (3), 25–39.
- Pasukeviciute, I., Roe, M., 2005. Strategic policy and the logistics of crude oil transit in Lithuania. *Energy Policy* 33, 857–866.
- Penrose, E.T., 1959. *The Theory of the Growth of the Firm*. Wiley, New York.
- Persson, G., Virum, H., 2001. Growth strategies for logistics service providers: a case study. *International Journal of Logistics Management* 12 (1), 53–64.

- Porter, M., 1985. *Competitive Advantage*. Free Press, New York.
- Prahalad, C.K., Hamel, G., 1990. The core competence of the corporation. *Harvard Business Review* 68, 79–91.
- Priem, R.L., Butler, J.E., 2001. Tautology in the resource-based view and the implications of externally determined resource value: further comments. *Academy of Management Review* 26 (1), 57–65.
- Rafiq, M., Jaafar, H.S., 2007. Measuring customers' perceptions of logistics service quality of 3PL service. *Journal of Business Logistics* 28 (2), 159–175.
- Ray, G., Barney, J., Muhanna, W.A., 2004. Capabilities business processes, and competitive advantage: choosing the dependent variable in empirical tests of the resource-based view. *Strategic Management Journal* 25, 23–37.
- Ray, G., Muhanna, W.A., Barney, J.B., 2005. Information technology and the performance of the customer service process: a resource-based analysis. *MIS Quarterly* 29 (4), 625–652.
- Reed, R., DeFillippi, R.J., 1990. Causal ambiguity, barriers to imitation, and sustainable competitive advantage. *Academy of Management Review* 15 (1), 88–102.
- Rubin, P.H., 1973. The expansion of firms. *Journal of Political Economy* 84, 936–949.
- Rushton, A., Walker, S., 2007. *International Logistics and Supply Chain Outsourcing*. Kogan Page.
- Sanders, N.R., Premus, R., 2005. Modeling the relationship between firm IT capability, collaboration and performance. *Journal of Business Logistics* 26 (1), 1–23.
- Sirmon, D.G., Hitt, M.A., Ireland, R.D., 2007. Managing firm resources in dynamic environments to create value: looking inside the black box. *Academy of Management Review* 32 (1), 273–292.
- Scott, W., 1955. Reliability of content analysis: the case of nominal scale coding. *Public Opinion Quarterly* 17, 321–325.
- Sheffi, Y., 1990. Third party logistics: present and future prospects. *Journal of Business Logistics* 11 (2), 27–39.
- Spens, K.M., Kovacs, G., 2006. A content analysis of research approaches in logistics research. *International Journal of Physical Distribution and Logistics Management* 36 (5), 374–390.
- Teece, D.J., 1998. Capturing value from knowledge assets: the new economy, markets for knowledge-knowhow, and intangible assets. *California Review* 40 (3), 55–79.
- Teece, D.J., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. *Strategic Management Journal* 18 (7), 509–533.
- Wernerfelt, B., 1984. A resource-based view of the firm. *Strategic Management Journal* 5, 171–180.
- Wright, P.M., McMahan, G.C., McWilliams, A., 1994. Human resources and sustained competitive advantage: a resource-based perspective. *International Journal of Human Resource Management* 5 (2), 301–326.
- Wouters, M., Sportel, M., 2005. The role of existing measures in developing and implementing performance measurement systems. *International Journal of Operations & Production Management* 25 (11), 1062–1082.
- Zineldin, M., 2004. Total relationship and logistics management. *International Journal of Physical Distribution & Logistics Management* 34 (3/4), 286–301.